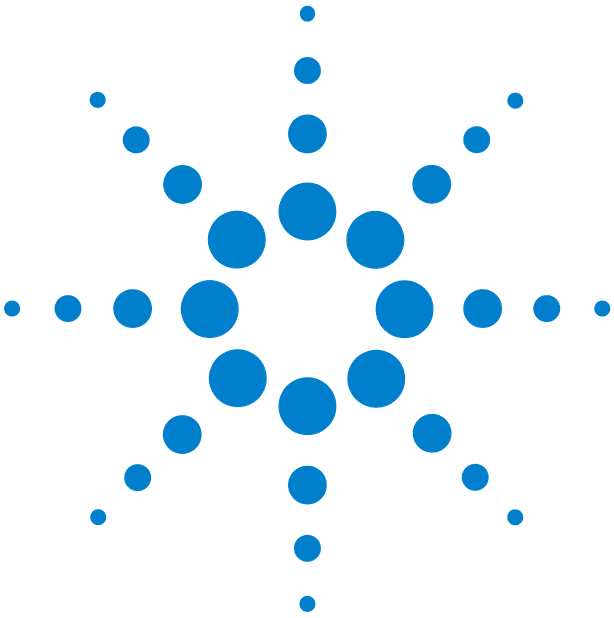

# Agilent Technologies N2640A WireScope™ Pro

## User's Manual

Version 1.0

Agilent Technologies

# Notices

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## Manual Part Number

5972-2770

## Edition

First Edition, August 2006 (Version 1.0)

Agilent Technologies Deutschland GmbH
Herrenberger Str. 130
71034 Böblingen, Germany.

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**CAUTION**

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# Declaration of Conformity

| Agilent Technologies | **DECLARATION OF CONFORMITY**<br>According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014 | CE |
|---|---|---|

**Manufacturer's Name:** Agilent Technologies International sarl
**Manufacturer's Address:** Rue de la Gare 29
CH - 1110 Morges
Switzerland

**Declares under sole responsibility that the product as originally delivered**

| | | |
|---|---|---|
| **Product Name:** | **Wirescope Pro - Network Performance Analyzer** | |
| **Product Number:** | **N2645A** | **- Main unit** |
| | **N2646A** | **- Dual Remote unit** |
| **Product Modules:** | **N2644A-...**[1]) | **- Smart Probes** |
| | **N2647SM** [2]) | **- SM Fiber Probe** |
| | **N2647MM** [2]) | **- MM Fiber Probe** |

**complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:**

- The Low Voltage Directive 73/23/EEC, amended by 93/68/EEC
- The EMC Directive 89/336/EEC, amended by 93/68/EEC

**and conforms with the following product standards:**

| | **Standard** | **Limit** |
|---|---|---|
| **EMC** | IEC 61326:2002 / EN 61326:1997+A1:1998+A2:2001+A3 :2003 | |
| | CISPR 11:1997+A1:1999 / EN 55011:1998+A1:1999 | Group 1 Class A |
| | IEC 61000-4-2:1995+A1:1998+A2 :2000 / EN 61000-4-2:1995+A1:1998+A2:2001 | 4 kV CD, 8 kV AD |
| | IEC 61000-4-3:2002+A1:2002 / EN 61000-4-3:2002+A1:2002 | 3 V/m, 80-1000 MHz |
| | IEC 61000-4-4:1995+A1 :2000+A2 :2001 / EN 61000-4-4:1995+A1:2001+A2:2001 | 0.5 kV signal lines, 1 kV power lines |
| | IEC 61000-4-5:1995+A1:2000 / EN 61000-4-5:1995+A1:2001 | 0.5 kV line-line, 1 kV line-ground |
| | IEC 61000-4-6:1995+A1:2000 / EN 61000-4-6:1996+A1:2001 | 3 V, 0.15-80 MHz |
| | IEC 61000-4-8:1993+A1:2000 / EN 61000-4-8:1993+A1:2001 | 30A/m |
| | IEC 61000-4-11:1994+A1:2000 / EN 61000-4-11:1994+A1:2001 | 1 cycle/100% |
| | Canada: ICES/NMB-001:1998 | |
| | Australia/New Zealand: AS/NZS CISPR 11:2002 | |
| **Safety** | IEC 61010-1:2001 / EN 61010-1:2001 | |
| | Canada: CAN/CSA-C22.2 No. 61010-1:2004 | |
| | USA: UL 61010-1:2004 | |

**Supplementary Information:**

[1]) The product number is followed by a 3 digit number to define smart probe modules
[2]) FDA accession no. 0620567

This DoC applies to above-listed products placed on the EU market after:

2006-September-25
Date

Hans-Martin Fischer
Name
PNT Quality Manager
Agilent Technologies
Title

For further information, please contact your local Agilent Technologies sales office, agent or distributor.

Template:A5971-5302-1, Rev. B.00 2006-September-25 Revision: A

# About This Book

This manual covers the use of WireScope Pro testers using software version 1.3.

Note that some systems running earlier software may not provide all of the features described in this manual; systems running later versions of software may operate differently than described in this manual. Be sure to refer to any user's manual supplements or release notes that came with the unit, or call your nearest Technical Support Center, listed on page 31.

## Getting Started

Chapter 1, "Getting Started", introduces the WireScope Pro tester, (called the Tester in this manual) and illustrates its features and controls.

Chapter 2, "Using WireScope", describes how to perform basic functions with the Tester, such as connecting power, installing probes and USB Flash drives, downloading software, and working with the WireScope Pro software.

## Cabling Certification

Chapter 3, "Testing Copper Cable", describes how to set up and run Autotests on copper cabling.

Chapter 4, "Testing Fiber Cabling", describes how to set up and run Autotests on optical fiber cabling.

Chapter 5, "Saving Test Results", describes how to save test results.

## Reference

Chapter 6, "Reference", describes the measurement details, calibration, and memory usage.

Chapter 7, "Specifications", describes the WireScope Pro's and Fiber SmartProbe's specifications.

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# WireScope at a Glance

## Control Buttons

You control the WireScope Pro using a combination of mechanical and on-screen buttons. The three mechanical buttons are at the bottom of the WireScope's face.

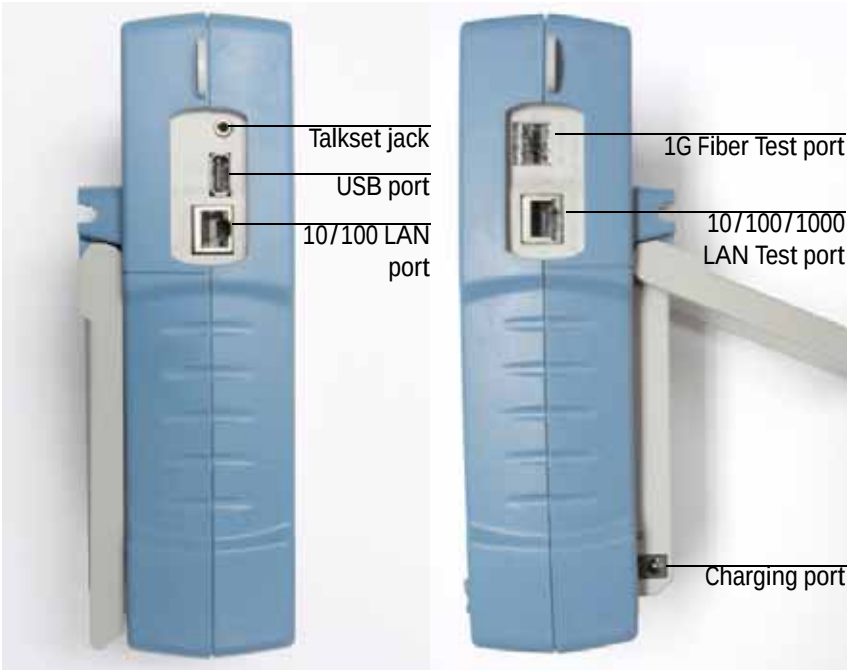
**Power** The **Power** button turns the unit on.

Pressing and holding the power button for four seconds turns the unit off.

**OK** Pressing the **OK** button executes a selected onscreen action. A dark blue color indicates the selected action on all screens.

**Scroll** The **Scroll** button scrolls screens that contain long lists.

## Ports




The ports on the left of the instrument are for connection to peripherals and controlling devices.

**Talkset jack** Both the WireScope Pro and DualRemote Pro have talkset jacks to improve coordination within testing teams. Operators can communicate over the tested cabling when autotests are not running. Headsets are included in the kit.

**USB port** The WireScope Pro has a universal serial bus (USB) interface for high speed communication with PCs and peripherals.

**LAN port** The 10/100Mb LAN (auxiliary port) port on the left of the WireScope Pro allows communication with a PC for software upgrades or data transfer.

The 10/100/1000Mb LAN and the 1G Fiber Test ports on the right of the WireScope Pro are test ports.

**SmartProbe bay** The SmartProbe bay accepts all compatible probes. The WireScope Pro automatically determines what type of probe is attached, selects appropriate screens and modes, and warns of any configuration conflicts.

NOTE

All laser sources specified in this user's manual are classified as Class 1 according to IEC 60825-1 (2001).
All laser sources comply with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated 2001-July-26.

# System Requirements

Depending on the SmartProbes you are using, the WireScope Pro kit contains everything needed to certify copper cabling to Category 6 or to Category 6A/7.

To certify optical fiber cabling, purchase a set of Fiber SmartProbes (included in the Fiber Professional Certification Kits).

For a list of available SmartProbes, please visit http://wirescope.comms.agilent.com

To print reports, archive test results, and download WireScope software upgrades and profiles, a Windows PC is required. The PC must run Windows 2000® or higher and the ScopeData Pro® software.

To transfer files, profiles, and software updates using the USB Flash drive, the PC must be equipped with a USB port.

# WireScope Pro Hardware

The WireScope Pro is enclosed in a rugged case designed to withstand the challenges of a construction environment. A tough “skeleton” with a molded bumper protects against damage.

## Touch Screen User Interface

A color touch screen simplifies navigation through menus and presents test data, resulting in faster operation and reduced training time.

## USB Flash Drive

The WireScope Pro stores test results, including plot data, in internal memory or on a USB Flash drive. Using the USB Flash drive means more storage capacity and lets you transfer test data without interrupting use of the WireScope Pro. The data to be uploaded directly to PCs using their USB port.

## Items Supplied

The WireScope Pro product kit has multiple configurations with the following options:

- **N2640A-100** WireScope™ Pro Cat 6 Standard Test Kit
- **N2642A-130** WireScope™ Pro Cat 6 Multimode Fiber Test Kit
- **N2642A-140** WireScope™ Pro Cat 6 Single Mode Fiber Test Kit
- **N2643A-150** WireScope™ Pro Cat 6 Professional Test Kit
- **N2642A-230** WireScope™ Pro Cat 6A/7 Multimode Fiber Test Kit
- **N2642A-240** WireScope™ Pro Cat 6A/7 Single Mode Fiber Test Kit
- **N2643A-250** WireScope™ Pro Cat 6A/7 Professional Test Kit

**CAUTION** Use only the 12V charger/adapter supplied with your WireScope and DualRemote. Using an incompatible charger or adapter can damage your WireScope equipment and void its warranty.

## Optional Accessories

For the latest optional accessories, go to Agilent Technologies' website at http://wirescope.comms.agilent.com

### Optional Probes and Accessories

- N2644A-100 Category 6A Universal Channel SmartProbe (set of two)
- N2644A-101 Category 6A Universal Permanent Link SmartProbe (set of two)
- N2644A-104 Siemon Category 7 TERA Channel SmartProbe (set of two)
- N2644A-105 Siemon Category 7 TERA Link SmartProbe (set of two)
- N2644A-106 Nexans Category 7 Link SmartProbe (set of two)
- N2647MM Dual-wavelength Multimode Fiber SmartProbe Set (set of two) with SC interface and patch cords
- N2647SM Dual-wavelength Single Mode Fiber SmartProbe Set (set of two) with SC interface and two patch cords
- N2641A-090 Replacement Accessories Bundle, WireScope Pro
- N2641A-095 256MB USB Flash Drive, WireScope Pro
- N2605A-132 Soft Carrying Case
- N2641A-134 Hard Carrying Case
- N2641A-135 Removable Battery Pack, WireScope Pro
- N2641A-097 USB Cable, WireScope Pro
- N2595A-094 Auto Lighter DC Power Adapter
- N2641A-080 Universal AC Adapter, WireScope Pro
- N2643A-100 Category 6A/7 Upgrade License

# WireScope SmartProbes

The WireScope Pro uses test probes called SmartProbes to connect to the cabling runs that it certifies. All WireScope Pro test probes plug into the SmartProbe module slot at the top of the WireScope and DualRemote. The WireScope Pro automatically detects any SmartProbes connected to it, and configures its interface to the matching parameters.

## WireScope probe configuration warnings

The WireScope Pro displays a warning when it detects a potential conflict between the detected probe and any of the test settings. Using an inappropriate probe can affect measurement accuracy. This is especially important for category 6, 6A and 7 installations.

**CAUTION** Never connect WireScope test probes or test cables to a voltage source, such a telephone jack. Excessive voltages can damage WireScope probes and the WireScope Pro analyzer, and void your warranty.

# Link and Channel SmartProbes

Each WireScope test kit includes SmartProbes for testing copper cabling in both Link and Channel configurations.

| | | |
|---|---|---|
| Universal Cat 6A Channel SmartProbe | N2644A-100 | |
| Universal Cat 6A Link SmartProbe | N2644A-101 | |
| Siemon Category 7 TERA Channel SmartProbe | N2644A-104 | |
| Siemon Category 7 TERA Link SmartProbe | N2644A-105 | |
| Nexans Category 7 Link SmartProbe | N2644A-106 | |

**Link** SmartProbes connect to the customer's wall plate and telecommunications panel jacks. The WireScope software compensates for the probe's transmission characteristics so they do not affect test results.

**Channel** SmartProbes connect to the customer's patch cords at the wall plate and telecommunications panel. The WireScope software compensates for the probe's transmission characteristics so they do not affect test results.

NOTE

A higher category SmartProbes can be used to test cabling to earlier standards. For example, a category 7 SmartProbe can be used to test cabling to category 6 or category 5.
Older probes cannot be used to test to newer standards. For example, a category 5 probe cannot be used to test to category 6 or 7 standard.

# Fiber SmartProbe

Installing a set of Fiber SmartProbes transforms the WireScope Pro into an optical fiber power meter and loss meter and cable length meter, for certifying optical fiber cabling. Fiber SmartProbes support many network-specific certification tests, including 1000BaseSX and 1000BaseLX. Each Fiber SmartProbe can both transmit and receive, for single-end or double-ended testing.

Fiber probes are sold in pairs, in these configurations:

- N2647SM - Singlemode 1310 nm and 1550 nm
- N2647MM - Multimode 850 nm and 1300 nm

Multimode Fiber SmartProbes have LED signal sources, and a range of 4 km in length for 850nm and 10 km for 1300nm.

Singlemode Fiber SmartProbes have Class 1 laser signal sources, and a range of 50 km in length.

Singlemode Fiber SmartProbe

Multimode Fiber SmartProbe

For detailed information and specifications of the available Fiber SmartProbes, visit: http://wirescope.comms.agilent.com/

# Cabling Certification and Tests

## Cabling Certification Standards

Certification testing with the WireScope Pro is highly automated. An *Autotest* function coordinates a series of measurements between the WireScope and DualRemote devices and analyzes the results to determine if the cabling run passes or fails the selected standards.

# Copper Cable Testing

Standards for structured twisted pair cabling require that both ends of each cable run be tested, to find the worst case performance condition. All certification testing requires a two-part test set, consisting of a main unit and a remote unit, each of which has similar test capabilities. One unit tests the cabling run from the telecommunications closet end and the other tests from the outlet end.

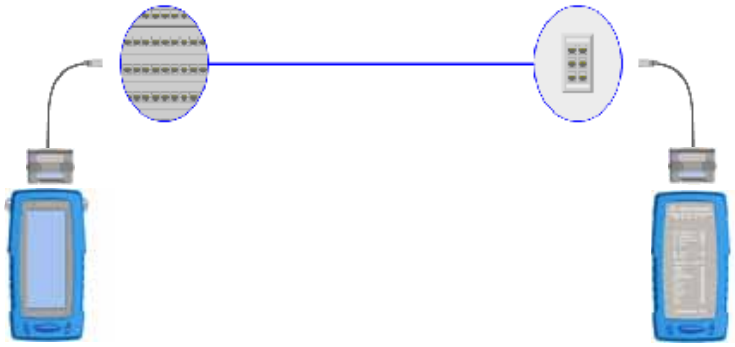
There are two primary considerations when testing:

- Whether the user patch cords are included in the cabling run during the test, if not -Link test configuration; if yes - channel test configuration.
- Which standard should be used (Category or Class.)

## Link and Channel Tests

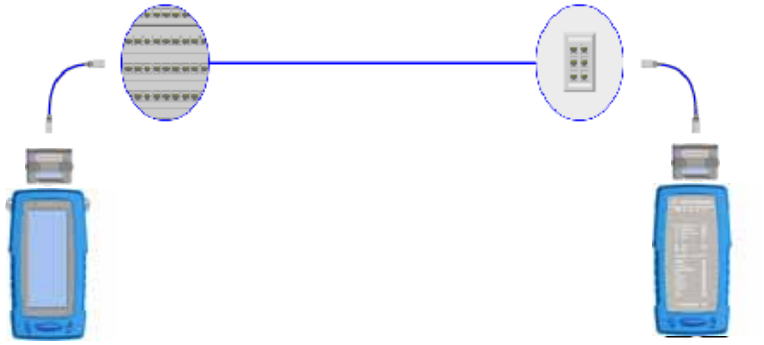
There are two commonly used configurations, *link* and *channel*, for certifying copper cabling.

### Link configuration



The link configuration is used in facilities still under construction, and does not include user patch cords. Because the link configuration does not include the two additional connections which the patch cords would produce, performance standards for link configuration tests are more stringent. The WireScope and DualRemote attach to the link under test with special link test probes.

## Channel configuration



The channel configuration includes the user patch cords at both ends of the cable run. The pass/fail limits applied when testing with the channel configuration are less stringent than for the link configuration, to allow for the performance degradation inherent in the two additional modular-8 connections.

The WireScope and the DualRemote attach to the channel under test with special channel probes.

# Optical Fiber Cable Testing

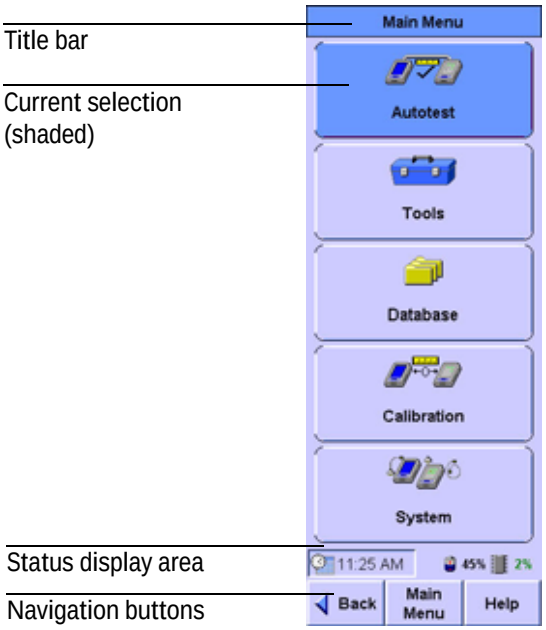
Fiber SmartProbes support many network-specific certification tests including:

- Multimode
  - TIA 568A, 568.3, ISO 11801
  - 1000BASE-SX, 1000BASE-LX
  - 100BASE-F, 10BASE-FL, 10BASE-FB,
  - Token Ring
  - ATM-155 (UNI 3.1), ATM-155 SWL, ATM-622, ATM/SONET OC-3, -OC-12
  - FDDI, Fiber Channel-133, -266, -531, -1062
- Single Mode
  - TIA 568A, 568.3, ISO 11801
  - 1000BASE-LX
  - ATM-622, ATM/SONET OC-3, OC-12, OC-48FDDI, Fiber Channel-133, -266, -531, -1062

# WireScope User Interface

The WireScope Pro's touch screen displays a layout of functions at each stage in the cable certification process.

## Touch Screen Layout




### Title Bar

The title bar identifies each screen.

### Selection Indicator

Selected onscreen item is shown in a darker blue background. When a screen first displays, the default selection is shown. Pressing a selection either highlights that item or activates it, if it is a control button.

### Status display area

The status display area shows the current time set on the WireScope Pro, talkset status, battery status, and storage status.

**Talkset icon** The talkset icon appears when a talkset is plugged in.

**AC Power icon** This icon appears when the external power adapter is connected to the WireScope and an ac power source.

**Battery Charge icon** When the WireScope operates using battery power, this icon shows the current battery state. The percentage figure is the amount of charge remaining in the battery.

**Storage icon** The storage icon indicates where test results are saved and how full the USB Flash drive or internal memory is.

= Results are saved to a USB Flash drive. In the example, the card is half full.

= Results are saved to internal memory. In the example, the internal memory is 2% full.

## Onscreen Buttons

Three navigation buttons display at the bottom of most screens.

**Back** Displays the previous screen

**Main Menu** Opens the Main Menu from any screen

**Help** Launches the Help viewer (see *Online Help,* on page 24)

## Data Entry Options

When WireScope testing requires entry of numbers or text, a text entry icon denotes fields that accept text. The WireScope Pro provides two ways to enter text:

- Typewriter-style keyboard (right)
- Telephone-style keypad (below)

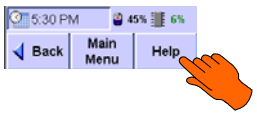
When using the telephone-style keypad, which is the default, you can enter text by first pressing the **A-Z** key. After that, pressing one of the numbered keys enters the first letter on the key. Pressing the key twice enters the second letter, and pressing the key three times enters the third letter.

Some of the keyboard buttons are small; using the stylus provided allows more precise control of which buttons are pressed.

The increase (**+**) and decrease (**–**) keys change the value of the currently selected field.

## Online Help

An extensive online Help system is available on the WireScope Pro, by pressing the **Help** button at the bottom of the screen.



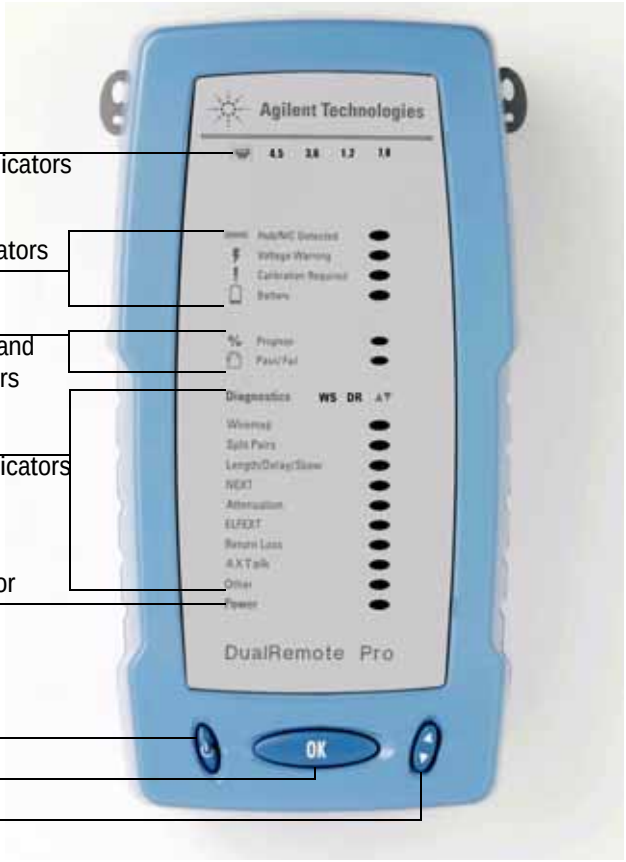

When you press the **Help** button, the Help window opens, describing the current screen. Help screens may contain text, graphics and hyperlinks to further information. While in the Help window, the following buttons are available at the bottom of the screen:

- **Back** returns to the previous screen
- **Exit** closes the Help viewer.

- **Index** opens the Help index window.

# The DualRemote Pro

The DualRemote Pro performs the same tests as the WireScope Pro, and is controlled by the WireScope. The DualRemote displays information using LED indicators.




## Control Buttons

The DualRemote Pro has the same control buttons as the WireScope Pro.

**Power** The **Power** button turns the unit on and off.

**OK** Pressing the **OK** button turns off all LEDs except the four Pair Status Indicators. These LEDs (green, red or orange) show the internal status of the DualRemote Pro, to determine whether it is working properly.

**Scroll** The Scroll button scrolls through the diagnostic indications. (See *Diagnostics,* on page 28)

## Indicators

### Pair Status Indicators

The pair status indicators turn green or red at the end of a test to show the status of each pair. A red indicator means the associated pair failed the current test.

### Warning Indicators

The warning indicators denote conditions that might prevent or impair testing.

**Hub / NIC Detected** The Hub/NIC Detected indicator means the DualRemote Pro is connected to a hub/Switch port or NIC port, instead of to a port connected to the WireScope Pro. [This function is not yet supported.]

**Voltage Warning** The voltage warning indicator means the DualRemote Pro is connected to a line which has a potentially damaging voltage present. This condition usually occurs when attempting to test a line that is connected to a telephone switch.

**CAUTION** If you see this indicator, *immediately disconnect the DualRemote from the line*. Failure to disconnect the line can permanently damage the DualRemote Pro.

**Calibration Required** The Calibration Required indicator means the DualRemote Pro is not calibrated to the WireScope Pro. The autotest will not execute until the calibration is performed.

**Battery** The battery indicator shows the current state of the DualRemote Pro battery charge.

- When an external charger is supplying power to the DualRemote the Battery indicator is steady green.
  - The LED on the battery pack is red while the battery is charging.
  - The LED on the battery pack is green when the battery is fully charged.
- When no external charger is connected to the DualRemote:
  - The Battery indicator is dark when the battery is operating normally.
  - The Battery indicator is red when the battery charge is low.

**CAUTION** Use only the 12V charger / adapter supplied with your WireScope and DualRemote. Using any other charger / adapter can damage your WireScope equipment and void your warranty.

### Test Progress and Result Indicators

**Progress** The Progress LED is green when a test is in progress, and otherwise off.

**Pass / Fail** The Pass/Fail indicator turns green when the test passes, or red when the test fails.

### Diagnostics

The Diagnostics section of the DualRemote Pro front panel provides more detailed information about failing test results.

**Wiremap** Turns red when a fault with the cable connections is detected.

**Split Pairs** Turns red when a split pair is detected.

**Length / Delay / Skew** Turns red when cable length, signal delay, or skew are outside the passing limits.

**NEXT** Turns red when near-end pair-to-pair or power sum faults are detected.

**Attenuation** Turns red when attenuation is outside passing limits.

**ELFEXT** Turns red when far-end pair-to-pair or power sum faults are detected.

**Return Loss** Turns red when the return signal loss exceeds passing limits.

**A X Talk** Alien cross-talk measurement indicator.

**Other** Turns red when any other failing test results occur.

If the cable run has multiple test failure causes, the **Scroll** button scrolls between diagnostic indications. The current selection blinks. The pair indicators and WS or DR indicators associated with the selected failure also blink.

### Power

The Power LED turns green when the DualRemote Pro is powered on.

# WireScope Software

## Probe Detection

The WireScope software automatically detects which probes are connected to the WireScope Pro and DualRemote Pro, and configures the testing program to match those probes. Conflicts between the installed probes and testing selections generate an error message.

## Digital Fault Finding

The WireScope's software automatically pinpoints cable fault locations and causes, speeding problem resolution and increasing operator productivity.

## Software Upgrades

Software upgrades for the WireScope Pro are available for download from the Agilent Technologies website, http://wirescope.comms.agilent.com/

See *Upgrading the WireScope Software,* on page 40, and refer to the *ScopeData Pro User's Guide* for instructions for downloading software to the WireScope Pro.

The DualRemote Pro uses the same software as the WireScope Pro. The Remote Calibration procedure detects any mismatch in software versions. To upgrade the DualRemote Pro after upgrading the WireScope Pro, perform a calibration. The WireScope Pro will guide you through the procedure for downloading software from the WireScope Pro to the DualRemote Pro.

## Standard Warranty

There is a standard one-year limited warranty against defects in materials and workmanship for the WireScope Pro, Dual Remote Pro and the Fiber SmartProbes. Accessories carries a 90 day warranty.Optional extended warranties for analyzers and accessories are available, as described on the Agilent Technologies website, http://wirescope.comms.agilent.com/

# Technical Support

If you have questions or comments about your WireScope Pro, contact our Technical Support department.

| | Country code | Area Code | Number | |
|---|---|---|---|---|
| Brazil | +55 | 11 | 4197 3600 | |
| Australia | | 1800 | 629 485 | |
| Austria | | 0820 | 87 44 11 | (in country number) |
| Belgium | +32 | (0)2 | 404 9340 | |
| Canada | +1 | 877 | 894 4414 | |
| China | | 800 | 810 0189 | |
| Denmark | +45 | | 70 13 15 15 | |
| Finland | +358 | 10 | 855 2100 | |
| France | | 0825 | 010 700 | (in country number) |
| Germany | | 01805 | 24 6333 | (in country number) |
| Hong Kong | | 800 | 938 693 | |
| India | | 1600 | 112 929 | |
| Ireland | +353 | (0)1 | 890 924 204 | |
| Israel | +972 | 3 | 9288 504 | |
| Italy | +39 | (0)2 | 9260 8484 | |
| Japan | | 0120 | 421 345 | |
| Luxembourg | +32 | (0)2 | 404 9340 | |
| Malaysia | | 1800 | 888 848 | |
| Mexico | | 01800 | 5064 800 | |
| Netherlands | +31 | (0)20 | 547 2111 | |
| Russia | +7 | 095 | 797 3963 | |
| Singapore | | 1800 | 375 8100 | |
| South Korea | | 080 | 769 0800 | |
| Spain | +34 | 91 | 631 3300 | |
| Sweden | | 0200 | 88 22 55 | (in country number) |
| Switzerland (French) | | 0800 | 80 5353 opt. 2 | (in country number) |

| | Country code | Area Code | Number | |
|---|---|---|---|---|
| Switzerland (German) | | 0800 | 80 5353 opt12 | (in country number) |
| Switzerland (Italian) | | 0800 | 80 5353 opt. 3 | (in country number) |
| Taiwan | | 0800 | 047 866 | |
| Thailand | | 1800 | 226 008 | (Toll-free for outside Bangkok) |
| United Kingdom | +44 | (0)7004 | 666 666 | |
| USA | | 800 | 829 4444 | |

Additional numbers and locations are available in the WireScope Help menu under Technical Support. You can also get help at the Agilent Technical Assistance Website: http://www.agilent.com/find/assist

## Before you call

Try to solve any problems using the WireScope Pro's built-in Help system. (See *Online Help,* on page 24)

When contacting the Technical Support department, please be ready to provide the following information:

- Serial numbers and software version of the WireScope and DualRemote units (see *Viewing Software and Hardware Version Information,* on page 41.)
- Detailed description of the problem, including the exact wording of any error messages and what was being done when the error occurred.
- Company name and street address.
- Contact name and telephone number.

# 2 Using WireScope

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# External and Battery Power

The WireScope Pro and DualRemote Pro are powered by Lithium Ion rechargeable batteries. These batteries contain circuitry that reports their state of charge to the WireScope. The units can also be powered by external an AC/DC power adapters. Connecting the adapters also charges the batteries.

A fully charged battery can run the WireScope for 5 to 8 hours before requiring recharging. The DualRemote's lack of an LCD screen allows it to run longer on a charge. Reducing screen brightness and enabling the Sleep function allows the WireScope to run longer on a charge.

**WARNING** **Do not calibrate or operate the WireScope or DualRemote while the battery is hot immediately after charging.**

**If the environment is causing the temperature rise, please move the tester to a suitable environment. Contact your nearest Technical Support Center if in doubt.**

## Using External Power

To power the WireScope or DualRemote with AC power, or charge their batteries:

1 Use the AC to DC adapter (N2641A-080).

**CAUTION** Use only the external adapter supplied in the WireScope Kit. Using other power adapters may damage the tester, and will void its warranty.

2 Connect the end of the adapter's cable to the charging jack on the side of the unit.

3 Plug the body of the adapter into an appropriate AC source.

## Removing the Battery

The batteries are located on the back of the WireScope and DualRemote.

To remove a battery:

1 Turn the unit off and disconnect the external adapter.

2 Fully open the stand on the back of the unit.

3 Pull the battery release tab toward the bottom of the unit and out.

## Battery Safety

To avoid the risk of fire, burns, or damage to your battery pack, do not allow metal objects to touch the battery contacts.

The battery pack is suitable for use only with compatible WireScope family devices.

Do not disassemble the battery pack. There are no user serviceable parts inside. Do not dispose of the battery pack in fire or water.

Handle a damaged or leaking battery with extreme care. If you come in contact with the electrolyte, wash the exposed area with soap and water. If the electrolyte contacts the eye, flush the eye with water for 15 minutes and seek medical attention.

Do not expose the battery pack to high storage temperatures (above 55°C).

When discarding a battery pack, contact your local waste disposal provider regarding local restrictions on the disposal or recycling of Lithium Ion batteries.

To obtain a replacement battery (part number N2641A-135), contact your local dealer.

Do not charge the battery pack if the ambient temperature is above 40°C.

# Connecting to Cabling for Certification

The WireScope Tester uses SmartProbes to connect to cabling runs. The Tester automatically detects which probes are installed in the WireScope and DualRemote, and selects matching test parameters.

To connect the Tester to a cable run:

1. Select the correct probe for the type of cabling to be certified. See Chapter 3, "Testing Copper Cable", or Chapter 4, "Testing Fiber Cabling".
2. Insert matching probes in the SmartProbe bays at the top of the WireScope and DualRemote.
3. Connect the SmartProbes to the ends of the cable run being tested.

## SmartProbes

Every WireScope SmartProbe contains a memory chip that keeps track of how many tests have been performed with the probe. This data is helpful for determining when the probe is reaching the end of its useful life.

**CAUTION** Never connect any WireScope probe to a voltage source such as a telephone jack. Excessive voltage will damage the WireScope and probe, and void the warranty.

### Viewing Probe Information

You can view detailed information about the probes attached to the WireScope and DualRemote. See *Viewing Probe Information,* on page 54 for copper test probes, or on page 81 for fiber test probes.

# Using Talksets

The 2-Way Talkset Kit (N2605A-137) allows operators at opposite ends of a copper cable run to coordinate their efforts. The Talkset Kit is included in the WireScope Pro and Fiber Professional Test Kit, or can be ordered separately.

To use talksets for communicating between the ends of a cable run:

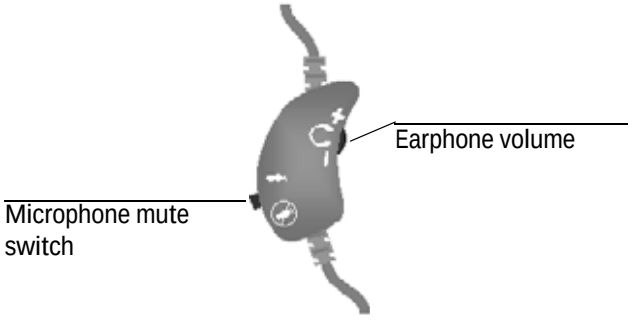
1. Insert a talkset's plug into the talkset jack on the WireScope, and the plug of another talkset into the jack of the DualRemote. See *Talkset jack,* on page 9, for the jack's location.
2. Connect the WireScope's and DualRemote's SmartProbes to the ends of a cable run.
3. Speak and listen as with any telephone headset.

NOTE

When a test is running, talkset communication is disabled. Wait until the test finishes before speaking.

## Talkset Controls

The WireScope talksets have two controls:




- The thumbwheel in the inside curve of the control housing controls the earpiece volume.
- The switch on the outside curve of the control housing switches the microphone off.

# Using USB Flash drives

The WireScope Pro can use a USB Flash drive for storing large amounts of test data, for transferring data to a PC, and for installing new software.

## Installing USB Flash drives

To install a USB Flash drive:

1 Find the USB port at the left of the WireScope Pro. See *USB port,* on page 9, for the location of the port.

2 Insert the USB Flash drive into the port. (If the drive does not go in easily, make sure it is oriented correctly.)

3 The WireScope detects the card, and asks if you want to merge the data from the device with the data on the drive.

If you select “No”, the WireScope will continue to use the internal memory.

If you select “Yes”, the data from internal memory is merged with the data on the USB Flash drive, and all further measurements are stored on the Thumdrive.

4 After the data has merged, press “OK” to continue using the WireScope.

## Configuring USB Flash drives

NOTE

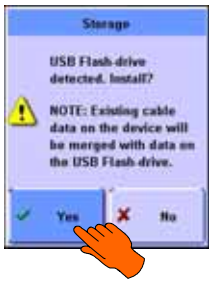
If the USB Flash drive gets corrupted and cannot be read by the WireScope, you must reformat it on a PC before attaching it.

To configure an installed USB Flash drive:

1 Insert the drive in the USB slot the WireScope. The Storage window opens.

2 On the Storage window, press **Yes**. The Storage Setup screen displays.

3 A screen describing the merge procedure displays.


Storage
USB Flash drive detected. Install?
NOTE: Existing cable data on the device will be merged with data on the USB Flash drive.
Yes
No

4 When the progress bar shows 100%, press **OK**. The WireScope Pro will automatically change the Storage: setting on the System Settings to USB Flash drive.

# Upgrading the WireScope Software

The latest WireScope software is available on the Agilent WireScope Website.

To download the software:

1 Using the Web browser on a PC, go to http://wirescope.comms.agilent.com/

2 Click on the link for “The Latest Software Package for your WireScope/FrameScope Product.”

3 Complete the registration page, and follow the instructions.

See the *ScopeData Pro User’s Guide* for instructions on installing the new software in the WireScope and DualRemote.

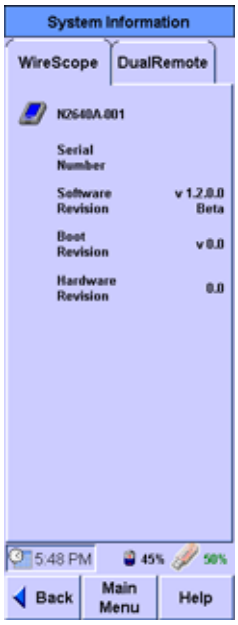
# Viewing Software and Hardware Version Information

To see the software and hardware revision levels, complete the following steps:

1 On the main menu, press the **System** button. The System Settings screen appears.

2 On the System Settings screen, select **System Information**, then press the **View** button. The System Information screen appears.

The System Information screen displays serial numbers and hardware and software version numbers for all of the key subsystems of your WireScope Pro test set.




The WireScope Pro and DualRemote Pro windows each consist of four parts:

- The serial number
- The software revision level
- The boot revision level, and
- The hardware revision level.

To view information for the last used DualRemote Pro, select the **DualRemote** tab.

# The System Settings Menu

The System Settings screen is a menu of controls for configuring and viewing information about the WireScope Pro.

To open one of the System Settings tools:

1 Press **System** on the Main Menu. The System Settings screen displays.

2 Select the desired tool, then press **Edit** or **View**. (The label on the large button near the bottom of the screen changes with different selections.) The selected tool's screen displays.

**System Information** The System Information screen displays information about the WireScope and DualRemote hardware and software.

**License Details** Here you can enter license details to enable different test features.

**Storage:** Opens a screen for choosing the destination for saved test results; internal flash memory or USB Flash drive.

**Power** Opens the Battery Status screen which shows the charge state of the batteries in the WireScope and DualRemote.

**Time and Date** This screen has controls for setting the date and time on the WireScope.

**User Interface** The User Interface Setup screen has controls for:

- Selecting length units
- Turning the touch-click sounds on and off
- Enabling and configuring the Sleep Timeout function
- Turning the speaker on and off
- Setting the screen contrast

**Operators** The Operator Setup screen has controls for entering the names and locations of the technicians using the WireScope and DualRemote.

**Calibrate Touchscreen** This screen guides you through a calibration of the touchscreen.
Make sure you have a stylus available before entering this function.

**Restore Default Settings** This screen lets you clear the operator list and custom limits. It also changes all settings back to a known state, which is it's main function.

**Demo Mode** This screen turns Demo mode on and off. Demo mode is useful when learning to use the WireScope and does not reflect the actual cable/run attached to the WireScope.

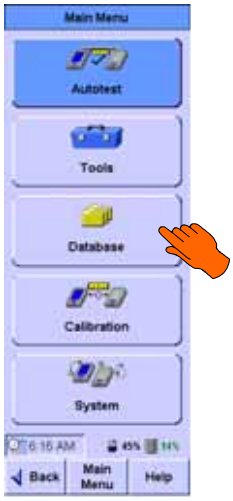
# The Database Menu

The Database screen is a menu button that leads to five databases:

- The Tests database contains saved test results.
- Database Reports are summaries of key statistics for saved test results, by site.
- The Site database contains tools for viewing, editing, and creating site configurations.
- The Cable Specs database contains tools for viewing, selecting, and creating cable types by manufacturer.
- The Connecting Hardware database contains tools for viewing, selecting, and creating connector types by manufacturer.

To display the Database screen:

1 On the Main Menu, press **Database**. The Database screen displays.




2 To view or edit one of the databases, press its button on the menu.

# 3 Testing Copper Cable

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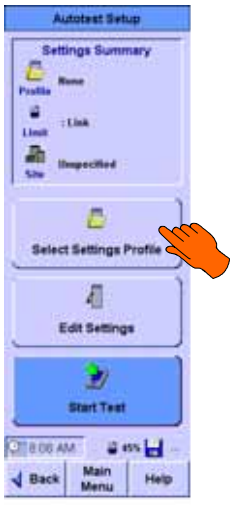
# The Autotest Setup

## Choosing an Existing Settings Profile

A profile is a predefined locked set of Autotest settings, locked to prevent the user from changing them. Default settings profiles exist for Cat 5, Cat 5E, Cat 6, Class D and Class E. With an optional license, profiles are also available for Cat 6A, Cat 7 and Class F. Previously defined settings profiles are added to the list of default profiles. To select an existing settings profile:

1 Press Autotest on the Main Menu.

2 In the Autotest Setup screen, press **Select Settings Profile**.



3 In the Profile Setup screen, select the desired profile. If the scroll bar is not full length, use the scroll rocker to scroll down to see more stored profiles

4 Press **OK** when done.

5 Press **Start Test** to run the Autotest.

NOTE

Locked settings are displayed with a padlock icon along the right edge of the Autotest Settings screen, reached by pressing **Autotest**, then pressing **Edit Settings**. If a locked setting needs to be changed, edit the profile as described below. Realize that you are violating the existing profile settings selection when doing this.

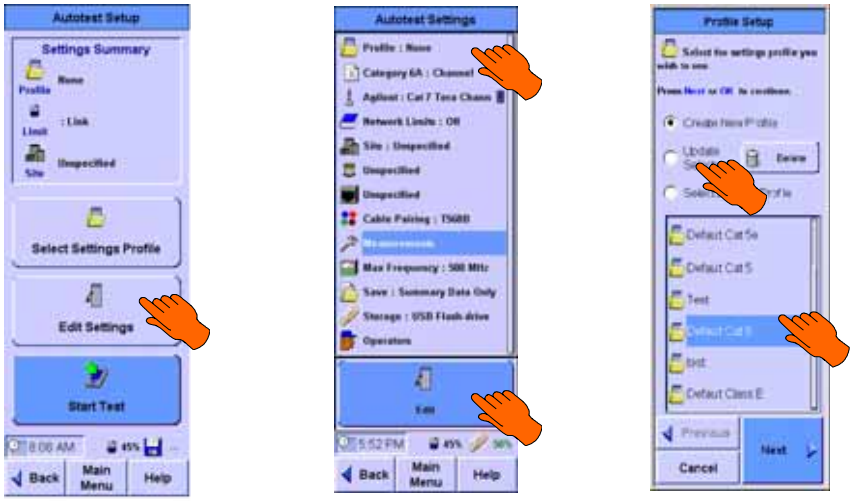
When selecting a setting profile, only the locked settings are set by the selection. Unlocked settings need to be verified as appropriate for the environment being tested.

## Editing an Existing Settings Profile to Remove a Lock

You may also edit or delete existing profiles, including the Default profiles. It is recommended that you do not edit nor delete the Default profiles, as you must reload the software to get them back in their original form to meet the standards. To create a profile similar to a default profile, first select the desired default profile to set the locked settings. Then create a new profile as described in the next section.

To edit an existing settings profile:

1 Press **Autotest**. On the Autotest Settings screen, press **Edit Settings**, then select **Profile**, then press **Edit**.



2 On the Profile Setup Screen, select the profile, then press Update Selected, then press **Next**.

3 Change the settings that are locked from further editing by selecting the appropriate boxes. The check marks toggle with subsequent presses. Then press **Next**. If the Test Probe setting is locked, you will see the center screen below, which will prompt you to select the Performance Grade of the probe as well as the Probe Test Count Limit, if desired. Then press **Next**. If the Test Probe setting is not locked you will go directly to the Password Screen, where you can choose to password protect your profile.

4 If you choose to password protect your profile, you will be prompted to enter the password.
Once you are satisfied with your password selection, press **OK** to return to the Autotest Settings screen, where the locks will be shown. If it is password protected, you will

now be prompted to enter the password in order to modify this profile.

## Creating a New Settings Profile

A new profile may be created either directly on the WireScope Pro or on a PC using ScopeData Pro and subsequently downloaded into the WireScope Pro. To create a settings profile directly on the WireScope Pro:

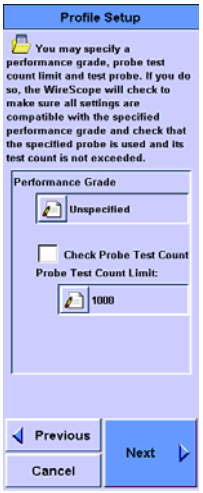
1 You must configure all the Autotest Settings before creating a new profile. Profiles created on the WireScope Pro use the existing settings for all the parameters. See the remainder of this section to configure the other settings.

2 Press **Autotest**. On the Autotest Settings screen, press **Edit Settings**, then press **Profile**, then press **Edit**.

3 On the Profile Setup Screen, select Create New Profile, then press Next. Press anywhere in the Profile Name area to open

a keyboard to allow you to enter the new profile name. After entering the new name, press OK, then press Next.

4 Change the settings that are locked from further editing by selecting the appropriate boxes. The check marks toggle with subsequent selections. Then press **Next**. If the Test Probe setting is locked, you will see the center screen below, which will prompt you to select the Performance Grade of the probe as well as the Probe Test Count Limit, if desired. Then press **Next**. If the Test Probe setting is not locked you will go directly to the Password Screen, where you can choose to password protect your profile.


Profile Setup
You may specify a performance grade, probe test count limit and test probe. If you do so, the WireScope will check to make sure all settings are compatible with the specified performance grade and check that the specified probe is used and its test count is not exceeded.
Performance Grade
Unspecified
Check Probe Test Count
Probe Test Count Limit:
1000
Previous
Next
Cancel

5 If you choose to password protect your profile, you will be prompted to enter the password. Once you are satisfied with your password selection, press **OK** to return to the Autotest Settings screen, where the locks will be shown. If it is password protected, you will now be prompted to enter the password in order to modify this profile.

## Setting the Test Limit

You can set the test limit according to several standards. To set the test limit to a certain standard:

1 Press **Autotest** on the Main menu. On the Autotest Setup screen press **Edit Settings**.

2 On the Autotest Settings screen select the icon second from the top of the list that looks like a page with a number or letter superimposed on it.

3 Then on the Limit Setup screen, select the desired cabling system performance grade.

NOTE

The scroll bar on the right of the screen shows the location of the data shown and is not a functional scroll bar. To scroll use the scroll rocker at the lower right of the WireScope.

4 Then press **Next**. The next Limit Setup screen allows you to select **Link** or **Channel** test configuration.

## Viewing Probe Information

The WireScope can display details about the probes inserted in the tester. If the probes are SmartProbes, the information includes the number of tests the probes have performed.

To view detailed information on the probe currently inserted:

1 Press **Autotest** on the Main Menu. The Autotest Setup screen displays. On the Autotest Setup screen, press **Edit Settings**. The Autotest Settings screen shows a menu of parameters and functions.

2 Select the name of the probe, then press **View**. The Probe Information screen displays, with information on the probe inserted in the WireScope.

3 If you desire to check the probe test count before each test, press **Check Probe Test Count** and enter the limit to be tested against.

4 To view information on the probe installed in the DualRemote, select the DualRemote tab. The Probe Information screen displays information about the probe in the DualRemote after running an Autotest.

5 If you desire to check the DualRemote probe test count before each test, press **Check Probe Test Count** and enter the limit to be tested against.

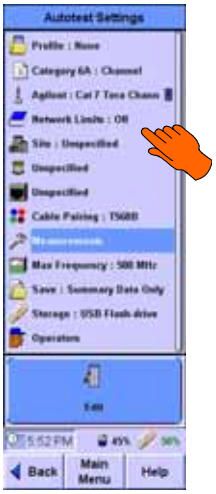
## Setting Network Limits

The WireScope Pro can determine compliance with signal to noise ratio (SNR) requirements for a variety of popular LAN technologies. To do this:

1 Press **Autotest** on the Main Menu. The Autotest Settings screen displays.

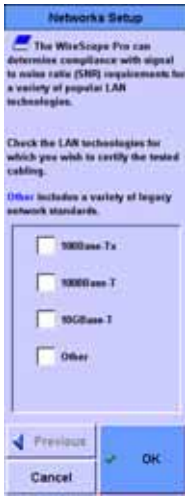
2 On the Autotest Setup screen press **Edit Settings**.

3 On the Autotest Settings screen press **Network Limits**. Then press **Edit**.




4 On the Networks Setup screen select the technology for which you want to certify the tested cabling. A red check will appear

in each technology selected. **Other** includes a variety of legacy network standards.

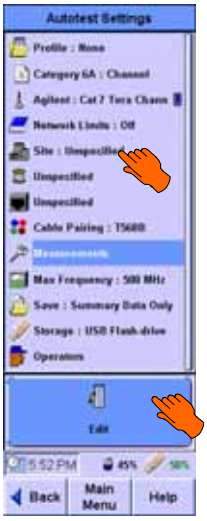



## Entering the Site Name

The site name identifies the group of settings used on a job, and can be applied to test records for that site.

To enter the site name:

1 On the Autotest Setup screen, press **Site**, then press **Edit**. The Site Setup screen displays.

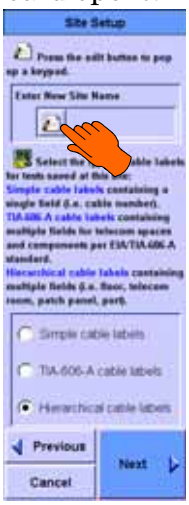


2 Select **Create a New Site Name**, then press **Next**. (The **OK** button changes to a **Next** button when you select **Create a New Site Name**.) The screen changes, to allow naming the site.

NOTE

To change the name or labeling format for an existing site, select the site name on the list, then press **Edit / View** and **Next**.

3 Select the icon under Enter New Site Name. The onscreen keyboard opens.



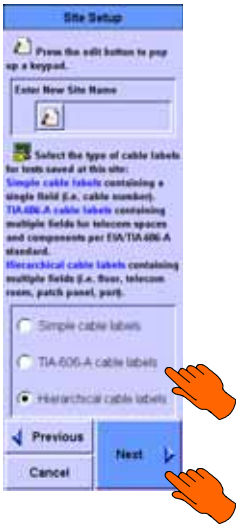

4 Press the keyboard keys to enter the site name, then press **OK**. The keyboard closes.

## Choosing the Labeling Format

The labeling format specifies the scheme used to label test records for that site. This format is applied to the test report and to labels printed for the job. There are three label format options:

- **Simple** has only one field, such as ‘cable number”. See page –58 for the Simple format configuration procedure.
- **TIA-606-A** complies with the TIA-606-A standard. See page –59 for the TIA-606-A format configuration procedure.
- **Hierarchical** has multiple fields, for designations such as Building, Floor, Wall Plate, and Jack Number. See page –60 for the Hierarchical format configuration procedure.

1 On the Site Setup screen, press the preferred labeling format, then press **Next.**




## Simple Label Format

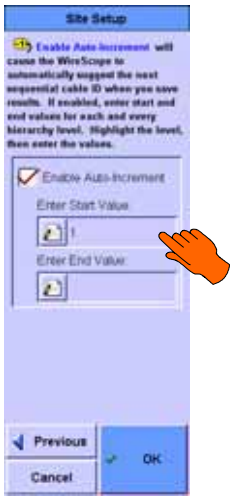
When you choose the Simple labeling format, the following screen displays:

To configure the simple labeling format:

1 If you want the numbers on the labels to increase automatically with each new label and test, press **Enable Auto-Increment** so that a checkmark appears, as in the figure above.

2 To set the beginning number to other than 1, press the **Enter Start Value** field. The onscreen keyboard opens.

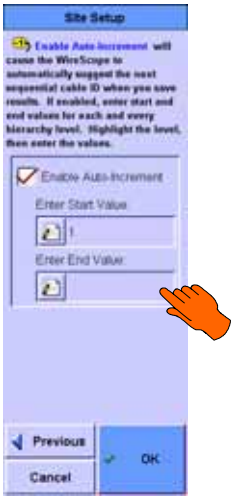
3 Press the backspace arrow to erase the number in the display, then press the number keys to enter the new starting number. Press **OK**. The keyboard closes, and the new starting number appears in the **Enter Start Value** field.



4 To set the number of cable runs to label and test, press the **Enter End Value** field. The onscreen keyboard opens.

5 Press the backspace arrow to erase the number in the display, if any, then press the number keys to enter the new number. Press **OK**. The keyboard closes, and the new ending number appears in the **Enter End Value** field.

6 Press **OK**. The Autotest Setup screen displays.




## TIA-606-A Label Format

When you choose the TIA-606-A labeling format and press **Next**, the following screen displays:

There are three formatting options within the TIA-606-A standard:

- Class 1 and Class 2 have fields for Floor, Telecom Room, Panel, and Position.
- Class 3 has fields for Building, Floor, Telecom Room, Panel, and Position.

The default Auto-Increment and number settings can be used, or the settings can be changed using the following procedures.

To configure the TIA-606-A labeling format:

1 Press **Class 1** or **Class 2** if there is only one building on the site.
Press **Class 3** if the site includes more than one building. Press **Next**.
The Site Setup screen changes to show the fields in the label, the Auto-Increment settings for the field highlighted, and the start and end values for the field highlighted.

2 If you want the numbers for any field to increase automatically with each new label and test, highlight that field, then press **Enable Auto-Increment** so that a checkmark appears, as in the figure above.

3 To set the beginning number for a field to other than 1, highlight the category name, then press the **Enter Start Value** field. The onscreen keyboard opens.

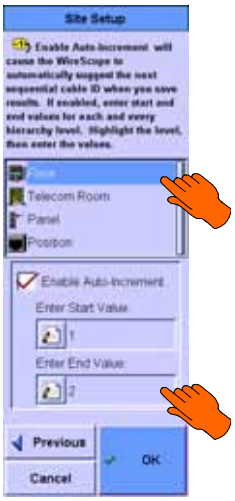
4 Press the backspace arrow to erase the number in the display, then press the number or letter keys to enter the new starting value. Press **OK**. The keyboard closes, and the new starting value appears in the **Enter Start Value** field.

5 To set the number of instances of a category (for example, the number of floors), press the **Enter End Value** field. The onscreen keyboard opens.

6 Press the backspace arrow to erase the value in the display, then press the number or letter keys to enter the new value. Press **OK**. The keyboard closes, and the new ending value appears in the **Enter End Value** field.

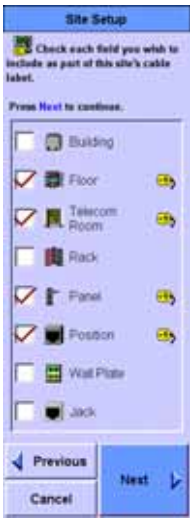
7 Repeat steps 2 through 6 for all the selected categories.

8 Press **OK**. The Autotest Setup screen displays.




## Hierarchical Label Format

When you choose the Hierarchical labeling format, the following screen displays:




Checkmarks indicate fields that appear in the labels. Yellow tags next to the categories indicate that automatic number incrementing is enabled for that field.

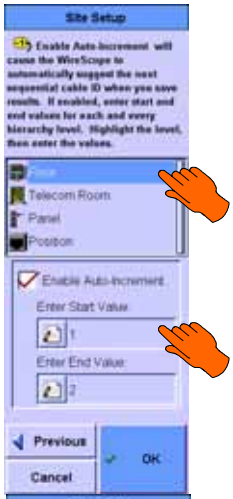
To configure the hierarchical labeling format:

1 Press a category to check it for inclusion in the label, or to uncheck it so it does not appear. When all the desired categories are checked, press **Next**. The Site Setup screen changes to show the selected categories.

2 If you want the numbers for any field to increase automatically with each new label and test, press the category, then press **Enable Auto-Increment** so that a checkmark appears, as in the figure above.

3 To set the beginning number for a field to other than 1, press the category name, then press the **Enter Start Value** field. The onscreen keyboard opens.

4 Press the backspace arrow to erase the number in the display, then press the number or letter keys to enter the new starting value. Press **OK**. The keyboard closes, and the new starting value appears in the **Enter Start Value** field.




5 To set the number of instances of a category (for example, the number of floors), press the **Enter End Value** field. The onscreen keyboard opens.

6 Press the backspace arrow to erase the value in the display, then press the number or letter keys to enter the new value. Press **OK**. The keyboard closes, and the new ending value appears in the **Enter End Value** field.

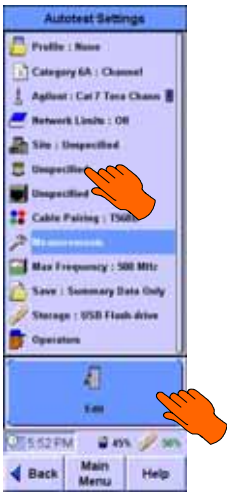
7 Repeat steps 2 through 6 for all the selected categories.

8 Press **OK**. The Autotest Setup screen displays.

## Choosing the Cable Type

Cable from different manufacturers has different transmission characteristics. The WireScope Pro compensates for those differences if you tell it what cable is used on the job. A grey cable spool icon indicates UTP cabling, a black cable spool icon indicates shielded cabling.

1 On the Autotest Setup screen, select the cable spool icon, then press **Edit**. The Cable Setup screen displays.




NOTE

The scroll bar on the right of the screen shows the location of the data shown and is not a functional scroll bar. To scroll use the scroll button at the lower right of the WireScope.

2 Select the cable manufacturer, and press **Next**. The Cable Database screen displays.

3 Select a cable on the list, and press **OK**. The Autotest Setup screen displays, with the selected cable type next to the cable spool icon.

### Adding a new cable type

If you have a cable which is not in the cable database, you can add a new cable description to the database.

1 If the manufacturer is not present, leave the manufacturer as **Unspecified**. If the manufacturer is present on the list, select it, then press **Next**. The Cable Database screen is displayed. In either case, you will be offered stored descriptions of cable types. If one of the stored descriptions matches the cable being tested, select it, then press **OK**.

2 If not, highlight **Add New Description**, and press **Next**.

3 Enter the name to be added to the database and press **Next**.

4 Enter the pair count, cable construction, and impedance (default selections are available) and press **Next**.

5 Enter the nominal velocity of propagation (NVP) for each pair, if known, or select **Calculate NVP from length**. If you need to calculate NVP from length, attach at least 50 feet (15 meters) of cable to the WireScope with the far end disconnected, enter the measured length, and press **Calculate**. The

NVP as a percentage of the speed of light will be supplied in the NVP window. Press **Next**.

6 Select the target performance grade of the cable, if known, and press **OK**. The Autotest Setup screen displays, with the new cable type next to the cable spool icon.

## Choosing the Connector Type

Connectors from different manufacturers have different transmission characteristics. The WireScope Pro compensates for those differences, if you tell it what connectors are used on the job.

1 On the Autotest Setup screen, select the connector icon, then press **Edit**. The Connector Setup screen displays.

**NOTE** The scroll bar on the right of the screen shows the location of the data shown and is not a functional scroll bar. To scroll use the scroll button at the lower right of the WireScope.

2 Select the manufacturer of the connector, then **Next**. A list of that manufacturer's connectors displays.

3 Select the name of the connector, then press **OK**. The Autotest Setup screen displays, with the selected connector type next to the connector icon.

### Adding a new connector type

If you have a connector which is not in the connector database, you can add a new connector description to the database.

1 If the manufacturer is not present, leave the manufacturer as **Unspecified**. If the manufacturer is present on the list, select it, then press **Next**. The Connector Setup screen is displayed. In either case, you will be offered stored descriptions of connector types. If one of the stored descriptions matches the connector being tested, select it, then press **OK**.

2 If not, highlight **Add New Description**, and press **Next**.

3 Enter the name to be added to the database and press **Next**.

4 Select whether the connector is shielded or not and press **Next**.

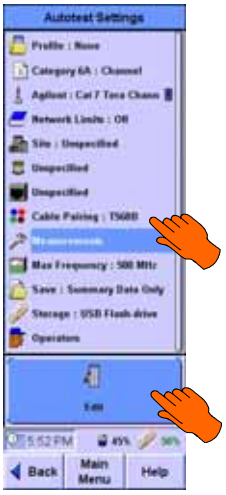
5 Select the performance grade of the connector, if known, and press OK. The

Autotest Setup screen displays, with the new connector type nest to the connector icon.

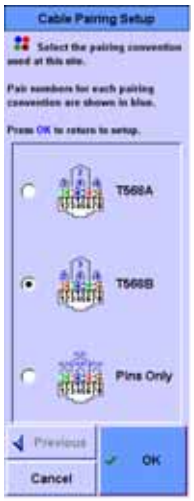
## Choosing the Cable Pairing Convention

To identify the correct pair in the test results, the WireScope must be told what cable pairing convention is used. For example, if the 3,6 pair fails a test, it would be “Pair 2” if using T568A pairing, but it would be “Pair 3” if using T568B pairing.

1 On the Autotest Setup screen, select **Cable Pairing**, then press **Edit**. The Cable Pairing Setup screen displays.




2 Select the cable pairing convention used on the job, then press **OK**. The Autotest Setup screen displays, with the cable pairing convention named.

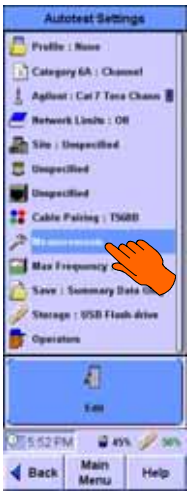


## Setting the Measurements

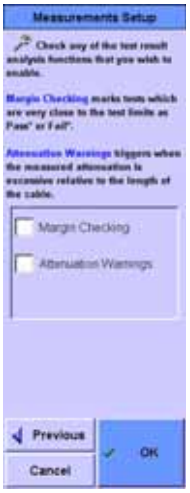
You can specify in detail what measurements are used to determine the certification status of your test. In addition, there are choices for optional features.

1 Press **Autotest** on the Main menu. On the Autotest Setup screen press **Edit Settings**.

2 On the Autotest Settings screen select **Measurements** and press **Edit**. The first Measurements Setup screen identifies the required measurements for the limits you have selected. It is possible to disable the measurements, but it is not recommended. Press **Next** to view the optional measurements you may want to add to your test. Add them by selecting the name or box.



3 After you have made your optional choices, press **Next** to allow you to enable test result analysis functions. It is recommended that you should choose Manufacturer Specific Compensation when you are performing Category 6 channel testing. Press **Next** when done.

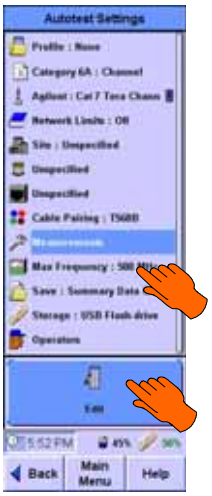


## Setting the Maximum Frequency

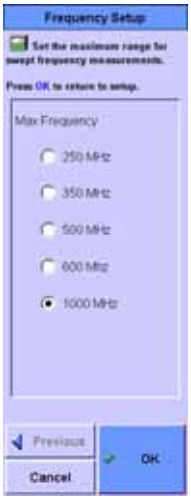
The WireScope Pro allows you to select the maximum range for swept frequency measurements. The choices depend somewhat on the standard selected previously, for example for Category 6, the 100 MHz choice is not available. To set the maximum frequency:

1 Press **Autotest** on the Main menu. On the Autotest Setup screen press **Edit Settings**.

2 On the Autotest Settings screen select **Max Frequency** and press **Edit**.




3 On the Frequency Setup screen select the maximum frequency of the data being displayed.




## Setting the Plot Storage Requirements

Another storage choice is available, whether to save plots or not. Saving plots stores the entire swept frequency measurement. Summary data is the worst case value for each test and is the minimum required for standards compliance. To set the data being stored:

1 Press **Autotest** on the Main menu.
On the Autotest Setup screen press **Edit Settings**.

2 On the Autotest Settings screen select **Save**, then press **Edit** to bring up the Save Mode Setup screen.

3 Select **Summary Data Only** or **Full Data Set** and press **OK**.

NOTE

If you save summary data only, you will not be able to recertify later with the saved data, since the plots will not be part of the stored data used for recertification by ScopeData Pro.

## Setting the Storage Location

This is the same function as that shown in the System Settings screen. Also when a USB Flash drive is inserted, this function will automatically set the storage location to the USB Flash drive See *Configuring USB Flash drives,* on page 38.

## Setting the Operator Names

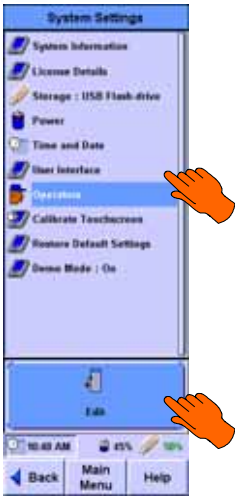
The names of the technicians performing the tests can be entered, and will appear on the test report.

The names of the technicians performing the tests can be entered, and will appear on the test report.

To enter the test technicians' names:

1 On the Main Menu, press **System**. The System Settings screen displays.

2 Select **Operators**, then press **Edit**. The Operator Setup screen displays.




3 Choose the WireScope unit's testing location, either **Telecom Room**, **Outlet**, or **Other**.

4 Press the **WireScope Operator** field. The onscreen keyboard opens, with "WireScope Operator" at the top or a list of previously entered names will appear with the keyboard and keypad buttons available.

5 Pick a name from the list or press the keyboard keys to enter the name of the technician using the WireScope, then press **OK**. The keyboard closes, and the technician's name appears in the **WireScope Operator** field of the Operator Setup screen.

6 Choose the DualRemote unit's testing location, either **Telecom Room**, **Outlet**, or **Other**.

7 Press the **DualRemote Operator** field. The onscreen keyboard opens, with “DualRemote Operator” at the top or a list of previously entered names will appear with the keyboard and keypad buttons available.

8 Pick a name from the list or press the keyboard keys to enter the name of the technician using the DualRemote, then press **OK**. The keyboard closes, and the technician’s name appears in the **DualRemote Operator** field of the Operator Setup screen.

9 Press **OK**. The System Settings screen displays.

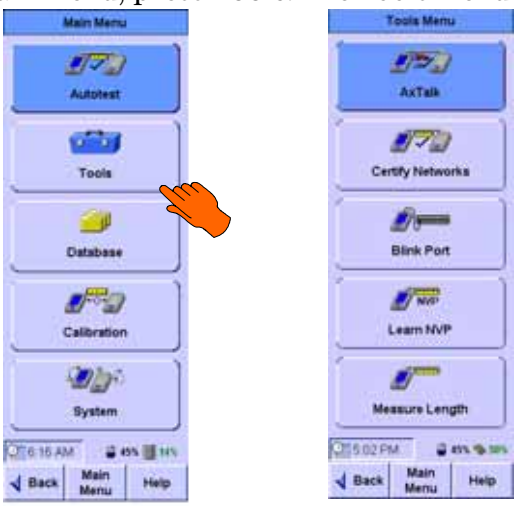
# The Tools Menu

The Tools menu includes the following:

- **AX Talk** Alien cross talk (you require an optional license to run this test).
- **Certify Networks** lets you choose standards for certification of the network. See *Certifying a Network,* on page 73.
- **Blink Port** blinks the LED on a circuit at an Ethernet hub or switch port. This helps locate the far end of a circuit. See *Blinking the Port,* on page 74.
- **Learn NVP** allows the user to determine the NVP (Nominal Velocity of Propagation) of a sample of cable. See *Learning the NVP of a Cable,* on page 75.
- **Measure Length** measures the length of each pair of a cable whose type is in the Cable Database. See *Measuring the Cable Length,* on page 76.

To open the Tools menu:

1 On the Main Menu, press **Tools**. The Tools Menu displays.



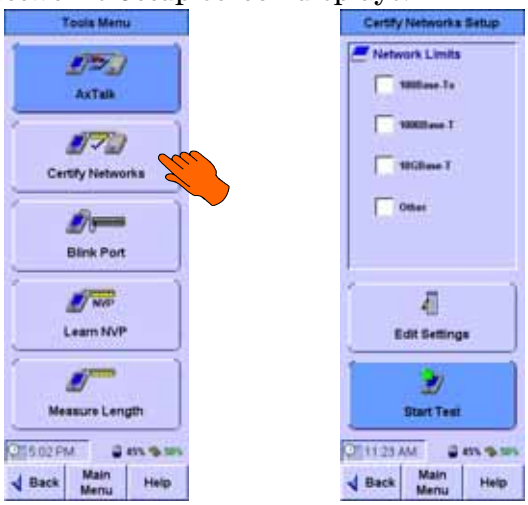

## Certifying a Network

The Tools menu includes **Certify Network**, which lets you test a cable for conformance to different network standards.

To certify a network:

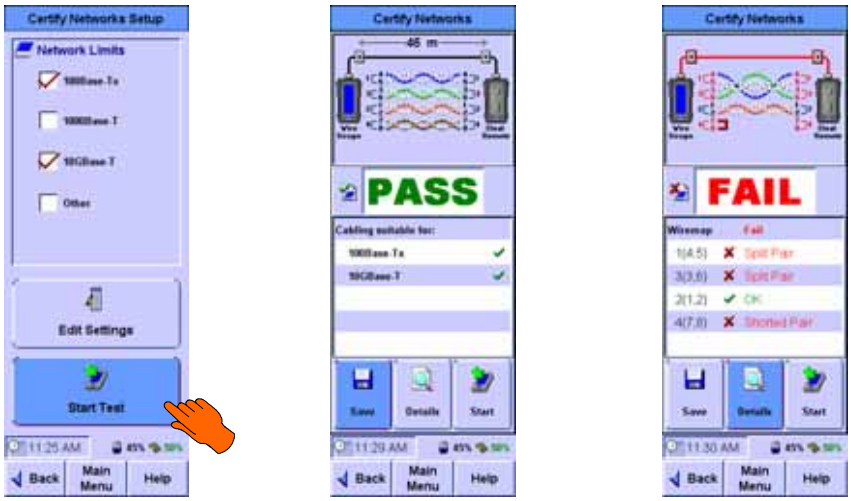
1 Connect the WireScope and DualRemote to the cable.

2 On the Tools Menu (see page 73), press **Certify Network**. The Certify Networks Setup screen displays.




3 Select a standard in the list to select it. A checkmark appears next to each selected standard.

4 To test the network to the selected standards, press **Start Test**. The test executes, and WireScope displays a Pass or Fail screen.



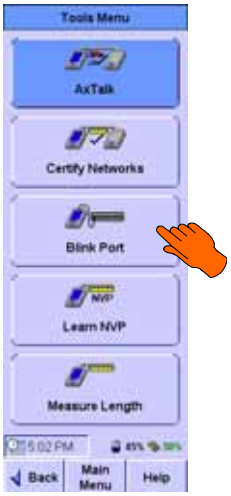

You can save and view details of the test results as with any test by pressing **Details**. See *Saving Test Results,* on page 91, and "Viewing Result Details" on page 93.

## Blinking the Port

To locate the switch or hub a cable is connected to, the WireScope Pro can blink the switch or hub port. The technician using the WireScope at the wall plate end of the circuit blinks the indicator on the panel at the hub or switch end.

To blink the port:

1 On the Tools menu (see page 73), press **Blink Port**. The Blink Port screen displays.




2 Press **Start**. The port begins blinking, and the **Start** button changes to a **Stop** button.

3 To stop the blinking, press **Stop**. The blinking stops.

## Learning the NVP of a Cable

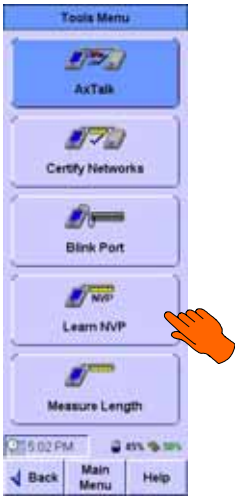
The WireScope can determine the NVP (Nominal Velocity of Propagation) of a cable, for use in certification testing. NVP is expressed as a percentage of the speed of light. you must use a sample of the cable at least 50 feet (15 meters) long. Longer cable samples produce more accurate results.

To learn the NVP:

1 Measure the length of a sample of the cable.

2 Connect the cable sample to the WireScope. Do not connect the DualRemote.

3 On the Tools menu (see page 73), press **Learn NVP**. The Learn NVP screen displays.




4 Select the Cable Length field. The numeric keyboard opens.

5 Press the backspace arrow to erase any value in the number field, then enter the length of the cable sample, in or meters. Press **OK**. The keyboard closes, and the Learn NVP screen displays new number in the Cable Length field.

6 Press **Calculate**. The WireScope calculates the NVP of the sample cable, and displays it in the NVP field.

## Measuring the Cable Length

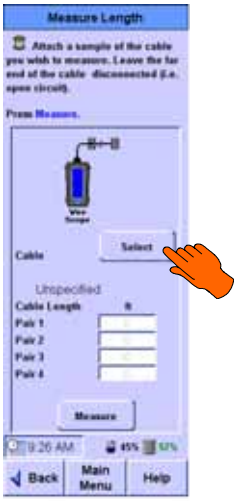
The WireScope Pro can measure the length of an attached cable if the cable type is in its database.

To measure the length of a cable:

1 Connect the WireScope to the cable. Do not attach the DualRemote.

2 On the Tools menu, press **Measure Length**. The Measure Length screen displays.

3 Press **Select**. The Cable Setup screen displays.



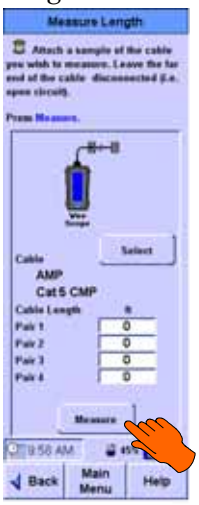

4 Select the cable manufacturer, and press **Next**. The Cable Database screen displays.

NOTE

The reason to select the cable type is that in order for the WireScope Pro to accurately measure length, it needs the proper NVP value stored with the cable specifications.

5 Select a cable on the list, and press **OK**. The Measure Length screen displays, with the selected cable type shown.

6 Press **Measure**. The WireScope calculates the length of the cable, and displays the length of each twisted pair on the Measure Length screen.



# 4
# Testing Fiber Cabling

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Viewing Probe Information 81
The Fiber Tools Menu 83
- Using the Loss Meter 83
- Measuring Length and Delay 84
- Using the Power Meter 85
- Using Trace Mode 85
- Learning the NVP of a Fiber 86

# About Fiber Test

WireScope includes many configuration and testing options not included in the standard test configurations.

# Viewing Probe Information

The WireScope can display details about the probes installed in the tester.

To view detailed information on the installed probes:

1 Press **Fiber Autotest** on the Main Menu. The Fiber Autotest Setup screen displays.

2 On the Fiber Autotest Setup screen, press **Edit Settings**. The Fiber Autotest Settings screen displays.

3 Press the name of the probe, then **View**. The Probe Information screen displays, with information on the probe installed in the WireScope.

4 To view information on the probe installed in the DualRemote, press the DualRemote tab. The Probe Information screen displays information about the probe in the DualRemote.

# The Fiber Tools Menu

The Fiber Tools menu contains the following:

- Loss Meter This tool continuously measures and reports the loss on connected fiber cables.
- Length & Delay This tool measures the length and propagation delay of connected fiber cables.
- Power Meter This tool measures the power level reaching the Fiber SmartProbe from a light source connected to the fiber cable.
- Trace Mode This activates the transmitter on the Fiber SmartProbe, to verify that light reaches the other end of a connected cable.
- Learn Fiber NVP This tool teaches the WireScope the NVP of a cable sample.

To open the Fiber Tools menu:

1 On the Main Menu, press **Fiber Tools**. The Fiber Tools screen displays.

## Using the Loss Meter

To use the Loss Meter:

1 On the Fiber Tools menu, press **Loss Meter**. The Fiber Loss Meter screen displays.

2 To clear the values in the data table at the center of the screen, press **Clear Peak**.

3 To write the current data table to the results database, press **Save.**

4 To select the test configuration, press **Quick Setup**.

## Measuring Length and Delay

To use the Length & Delay tool:

1 On the Fiber Tools menu, press **Length & Delay**. The Fiber Length Test screen displays. If a valid fiber connection is present, a **Measure** button appears.

2 To begin the test, press **Measure**.

3 To select the test configuration or NVP, press **Quick Setup**.

Once there is a valid connection, the length and delay are updated continually.
Press the **Measure** button to force a measurement.

## Using the Power Meter

To use the Power Meter:

1 On the Fiber Tools menu. press **Power Meter**.

2 To set the current power value as a reference, press **Set Reference**.

The difference is shown in the Delta field. The actual measurement is shown in the Optical Power field.

3 To write the current data table to the results database, press **Save.**

NOTE If the transmitter is on, you can measure its transmitting power using a loop-back reference fiber.

## Using Trace Mode

To turn on the Fiber SmartProbe's transmitter:

1 Connect the fiber you want to trace to the Fiber SmartProbe.

2 On the Fiber Tools menu, press **Trace Mode**.
The Fiber Trace Mode screen displays and indicates that the transmitter is active.

## Learning the NVP of a Fiber

To learn the NVP of a fiber cable sample:

1 Connect a known length sample of the fiber to the Fiber SmartProbe. The sample must be at least 50 feet (15 meters) long.

2 On the Fiber Tools menu, press **Learn Fiber NVP**. The Learn Fiber NVP screen displays.

3 Use the Quick Setup to help select the cable for single ended or double ended test configuration and to provide fiber construction details prior to the test. Ensure you select the same type of fiber for calibration that you are testing.

4 You may need to calibrate using the test jumper depending on which test configuration you choose. If you need to calibrate, use the Calibration tool on the Main Menu.

5 Press the Fiber Length field. The numeric keyboard opens.

- When measuring two fibers, enter the average length of the two.
- When measuring one length of fiber looped back to the WireScope, enter the entire length of the fiber.
- Make sure you use the correct length units (feet or meters.)

Enter the length of the sample fiber, and press **OK** to close the keyboard.

6 Press **Measure** to learn the NVP of the fiber sample. The NVP displays in the NVP (%) field of the Learn Fiber NVP screen.

# 5
# Saving and Viewing Test Results

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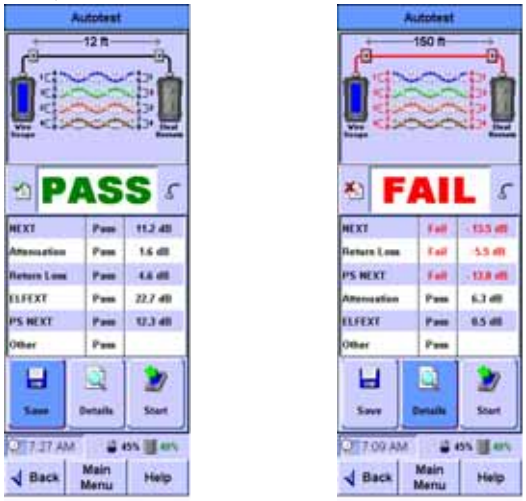
Saving the Results 91
Interpreting Test Results Detail Screens 94
Viewing Result Details 93

# Test Results Display

When the WireScope completes a test, it displays either a Pass or Fail screen. All the example screens in this chapter are from Category 6 tests; other test result screens are similar.




Both the Pass and Fail screens list the test parameters, with the results of each parameter. On Fail screens, results that failed the test are shown in red.

# Saving Test Results

Before saving test results, choose the storage site to save them to.

NOTE

The procedures below show screens from the copper testing configuration. The procedures for fiber testing are essentially the same, but the screens may differ in minor details.

## Choosing the Data Storage Location

Test data can be saved to either the WireScope's internal memory or, if you insert a USB Flash drive, the data is to this. The data you had already saved to internal memory is transferred automatically to the USB Flash drive.

## Saving the Results

To save the test results for inclusion in certification reports:

1 After completing a test, press the **Save** button. The Save Results screen displays.

2 If the cable ID in the display is wrong, press the backspace arrow to erase it, and press the keyboard keys to enter the correct cable ID. For a cable ID with multiple fields, press **Shift**, then **Tab** to back up to a prior field, or use your stylus or finger to get to the desired field. An unshifted **Tab** will move the cursor forward one field.

3 When the label is correct, press the **Save** button. The WireScope saves the results of the test to the chosen storage site. If you have a multiple-field cable ID, there must be a

value in every field, including before the first yellow dot and after the last yellow dot.

# Viewing Result Details

A **Details** button on Pass and Fail screens opens the Test Data screen.

Depending on the test you ran, the Test Data screen lists the test parameters and indicates passing or failure for each.

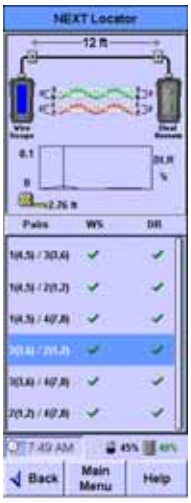
To view detailed test data for one of the test parameters:

1 Press the name of the test parameter.
The Test Data screen displays buttons appropriate for the selected parameter.

For example, when **NEXT** is selected, the screen includes **Data**, **Plots**, and **Locator** buttons. If you select **Wiremap** only the **Data** button is available.

- To view the Data screen for the selected test parameter, press **Data**. The Data screen displays.

- To view the Plots screen for the selected test parameter (if the Plots button is present), press **Plots**. The Plots screen displays.
- To view the Locator screen for the selected test parameter (if the Locator button is present), press **Locator**. The Locator screen displays.

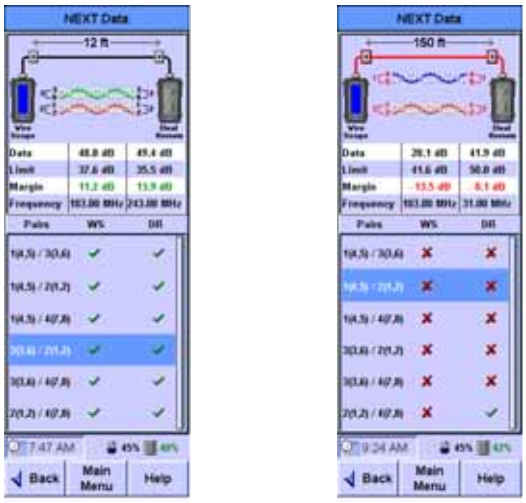



## Interpreting Test Results Detail Screens

The various test detail screens present test data in different formats, as explained below.

## Data Screens

The Data screen shows detail of the selected test parameter results.

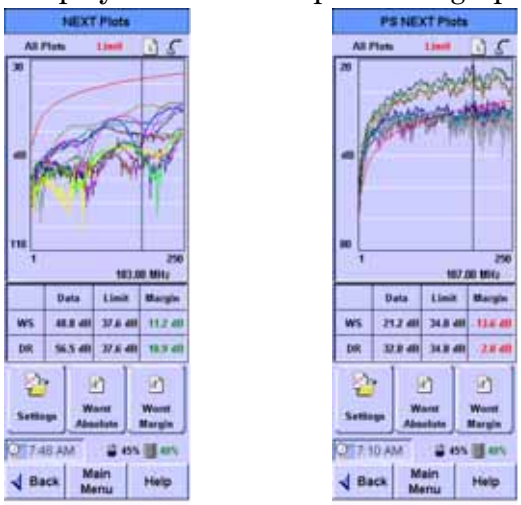



The examples above show data of a passing test, at left, and a failing one, at right. The data included depends on which parameter is selected (see step 1 of "Viewing Result Details" on page 93).

The Data screens shown above include a table that displays details of the test results for two twisted pairs of copper cable. To view the results for a different set of twisted pairs, select it in the list.

## Plots Screens

Plots screens display test results as plots on a graph.




The examples above show plots of a passing test, at left, and a failing one, at right. A smooth red line on the plot indicates the

limit boundary between passing and failure.
The **Worst Margin** button places a vertical line on the plot at the frequency where the test results come closest to the pass/fail boundary on passing test plots. On failing test plots, the **Worst Margin** button places the line at the frequency where the results exceed the acceptable limits the most.

You can move the cursor around the plot screen by pressing the area you want to see and then using the scroll rocker to fine tune the location. The frequency of the cursor is displayed and the values in the table correspond to the cursor location.

A chart below the plot shows detailed results of the current location of the cursor at the WireScope and DualRemote, and the limits for the test parameter, as follows:

**Data** This is the worst case of the test results at the cursor location.

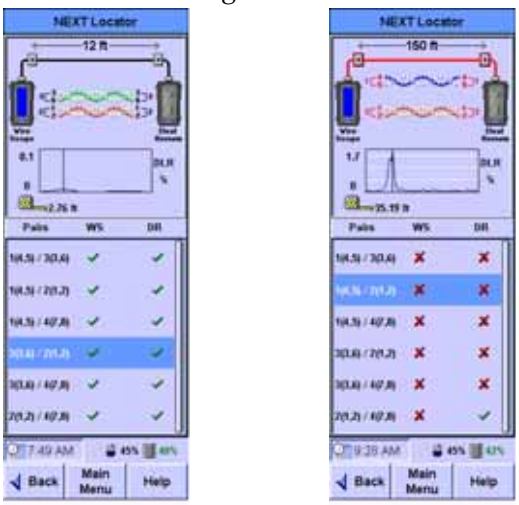
**Limit** The limit of passing results, set when the test standard is chosen at the cursor location.

**Margin** The difference between the Data value and the Limit value at the cursor location.

The plots are color coded for different wire pairs. The plot lines displayed can be changed by pressing **Settings** and selecting All Plots, All Local Plots, All Remote Plots, Worst Case Plot, or Select Single Plot. You can also choose to show plots to 100 MHz, 250 MHz, or 350 MHz (assuming the test was run at the frequency selected). See “Setting the Maximum Frequency” on page 69.

## Locator Screens

Locator screens aid in finding faults on the tested cable.




The examples above show Locator screens for a passing test, at left, and a failing one, at right. Note the difference in the plots: the failing result shows a peak where the failure occurs. The tape measure provides a reading of where the failure occurs. It will be placed on the right-hand side of the screen if showing the distance from the DualRemote. If there is more than one peak, you can press the plot area near the peak and fine tune the location using the scroll rocker to find the exact distance to the peak. By default, the distance shown is how far away the worst test result is from the closest of the WireScope or DualRemote. To see the locator results for the different sets of twisted pair cables, press them on the list.

**NOTE**

Failures very near the ends of a cable run are usually because of termination errors such as a bad crimp. Failures far from the ends of a cable run are usually a fault with the cable itself.

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# Measurements

The WireScope Pro makes the following test measurements.

## Wiremap

Wiremap testing checks for proper continuity and termination of cables. The test identifies the following faults:

- Short circuit
- Open circuit
- Reversed pairs
- Transposed pairs
- Split pairs
- Shield continuity faults

## Length

Length measurements determine the electrical length of cable runs up to 100 m (328 feet), at NVP > 0.6. Accurate length measurements require accurate NVP settings. Choosing a cable type from the WireScope Pro's database automatically loads NVP settings, or the NVP for a cable can be measured on a sample (see "Learning the NVP of a Cable" on page 70).

### Length Measurement Specifications

| | |
|---|---|
| **Accuracy** | ± 1 m (3.3 ft) |
| **Resolution** | 0.5 m (1.6 ft) at NVP = 0.7 |
| **Minimum Distance** | 0 m (0 feet) |
| **Maximum Distance** | 100 m (328 ft) |

## Propagation Delay and Skew

The Propagation Delay test measures the one-way propagation delay over each pair of the tested cable run. Skew is the difference in propagation delay between the pairs with the longest and shortest delay in a cable.

### Propagation Delay and Skew Measurement Specifications

| | |
|---|---|
| **Accuracy** | ± 6 ns |

| | |
|---|---|
| **Resolution** | ± 1 nanoseconds |
| **Minimum Delay** | 0 nanoseconds |
| **Maximum Delay** | 1,100 nanoseconds |
| **Delay Skew** | The difference in nanoseconds between the longest and shortest measured propagation delay among the four pairs of a single cable run |

## Near-end Crosstalk (NEXT)

NEXT measures near-end coupling between pairs in the tested cable run, at both ends of a cable, over 6 pair combinations.

**NEXT Measurement Specifications**

| | |
|---|---|
| **Frequency Range** | 1 – 1000 MHz |
| **Frequency Step Sizes** | 125 kHz, 250 kHz, 500 kHz, 1 MHz, 2.5 MHz set automatically based on selected standards |
| **Resolution** | 0.1 dB |
| **Dynamic Range** | 90 dB |
| **Baseline Accuracy** | TIA Level IV requirements |

## Attenuation

Attenuation measures the decrease in signal strength over the length of all pairs in a cable.

**Attenuation Measurement Specifications**

| | |
|---|---|
| **Frequency Range** | 1 – 1000 MHz |
| **Frequency Step Size** | 125 kHz, 250 kHz, 500 kHz, 1 MHz, 2.5 MHz set automatically based on selected standards |
| **Resolution** | 0.1 dB |
| **Dynamic Range** | 60 dB |
| **Baseline Accuracy** | TIA Level IV requirement |

## Equal Level Far-End Crosstalk (ELFEXT)

ELFEXT measures far-end coupling between pairs in the tested cable, for all pair combinations.

**ELFEXT Measurement Specifications**

| | |
|---|---|
| **Frequency Range** | 1 – 1000 MHz |
| **Frequency Step Size** | 125 kHz, 250 kHz, 500 kHz, 1 MHz, 2.5 MHz set automatically based on selected standards |
| **Resolution** | 0.1 dB |
| **Dynamic Range** | 90 dB |
| **Baseline Accuracy** | TIA Level IV requirements |

## Attenuation-to-Crosstalk Ratio (ACR)

The ratio of the measured attenuation and the near-end crosstalk (NEXT) at each frequency point.

## Power Sum NEXT (PSNEXT)

Computed for each pair by calculating a power sum total of the pair-to-pair NEXT from the three other pairs.

## Power Sum ELFEXT (PSELEXT)

Computed for each pair by calculating a power sum total of the pair-to-pair ELFEXT from the three other pairs.

## Power Sum ACR (PSACR)

The ratio of the measured attenuation and the computed power sum near-end crosstalk (PSNEXT) at each frequency point.

## Resistance

The DC loop resistance for each pair in the tested cable run.

**Resistance Measurement Specifications**

| | |
|---|---|
| **Range** | 5 – 1,000 Ω |
| **Accuracy** | ± 5% |
| **Resolution** | 1 Ω |

# Calibration

## Measurement Calibration

### Remote Calibration

Remote calibration establishes a common zero reference for the WireScope Pro and its associated DualRemote Pro. There is no need to calibrate the WireScope with the DualRemote before a copper cabling measurements.

However, you must perform this calibration under the following conditions

- When you are using a different DualRemote from the one originally shipped with the WireScope Pro.
- After upgrading the software of the WireScope Pro.
- Before any Fiber measurements, except power meter.

The WireScope Pro stores the serial number of the DualRemote that it has been calibrated with. Before each measurement, the WireScope checks the serial number of the DualRemote to which it is connected.  If the WireScope does not have the remote calibration data stored for the detected DualRemote, a warning appears, asking you to perform a calibration.

### Environmental Calibration (Internal)

Environmental calibration compensates for the effects of ambient temperature and voltage variations. The WireScope Pro and DualRemote Pro use internal calibration paths to connect the signal source and measurement circuits, establishing a local calibration reference before each measurement. No operator involvement is required.

## Touch-Screen Calibration

If it seems that the WireScope Pro is not responding correctly to taps on the touch screen, you may need to calibrate the touch screen to bring it into alignment with the underlying display.

To calibrate the touch screen:

1 Ensure that you have the stylus available.

2 On the Main Menu, press **System**. The System Settings screen displays.

3 On the System Settings screen, press **Calibrate Touch Screen**, then press **Edit**. A Calibration screen displays.

4 Using the stylus, press the screen where the onscreen instructions direct.

When the calibration is complete, the System Settings screen displays.

# Memory Requirements

The amount of memory that each test result takes up depends on the options that you set before starting the test. Generally, if you save plots with each test, test result files are larger than if you omit plots.

The WireScope Pro allocates approximately 16MB of internal Flash memory for test result storage. The exact amount of memory available depends on the size of the WireScope Pro software.

The following table lists approximate record storage capacities for the internal Flash memory when configured for 64MB and for a 256 MB removable USB Flash drive and for comparison, a 1 GB Flash drive.
All sizes of USB Flash drive will work as extra storage.

**Saved Test Capacities**

| Autotest Configuration | Capacity (# of Records) | | |
|---|---|---|---|
| | Internal Flash 64 MB (16MB usable for results) | USB Flash drive 256 MB (supplied) | USB Flash drive 1 GB |
| Category 6/6A/7 summary only | 4,800 | 77,500 | 310,000 |
| Category 6/6A/7 with full plot data (1 GHz) | 160 | 2,600 | 10,300 |

# 7 Specifications

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# General Specifications

## Test Parameters

- Supported frequency range: 1MHz to 1GHz
- Complies with TIA Level IV Accuracy

## Power Supply

- Removable/Rechargeable Li-Ion batteries, provide 5 to 8 hours of continuous operation
- AC Power adapter: 100~240V AC, plugs directly into the battery. Can be recharged separate from the instrument.

## Memory

- 64 MByte internal flash memory
- 256 MByte USB Flash Drive included, allows for flexible test record storage

## Connectivity

- SmartProbe Interface Connector
- Auxiliary 10/100Mbit/s Ethernet port, RJ-45
- Universal Serial Bus (USB1.1) port
- Talkset interface: 3.5mm stereo jack

## Software Upgrade

Semi-automated software upgrade from Agilent FTP site, or using USB Flash Drive, or using USB connection to PC

## Dimensions

- Size: 232 mm x 126 mm x 86.7 mm (9.13” x 4.96” x 3.41”)
- Weight: approx. 1.36 kg (approx. 3.0 lbs.)

## Environmental Conditions

- Operating Temperature: 0°C to +40°C
- Storage Temperature: –10°C to +55°C
- Relative Humidity: 10% to 80%

- Operating Altitude: up to 3000 meters
- Pollution Degree: 2

# N2644A Series Category 6A Universal Channel and Link SmartProbe, Category 7 Channel and Link SmartProbe

## General Specifications

- Size: 79.5 mm x 60.5 mm x 44 mm (3.1” x 2.4” x 1.7”), excluding cable
- Operating Temperature: 0°C to +40°C
- Storage Temperature: –40°C to +55°C

| Measurement Parameter | Range | Resolution | Accuracy |
|---|---|---|---|
| Length | 0 – 100 m at NVP > 0.6 | 0.5 m at NVP = 0.7 | ± 1 m |
| Propagation Delay and Skew | 0 – 1100 ns | ±1 ns | ± 6 ns |
| Attenuation | 60 dB | 0.1 dB | 1 |
| Near End Crosstalk (NEXT) | 90 dB | 0.1 dB | 1 |
| Equal Level Far End Crosstalk (ELFEXT) | 90 dB | 0.1 dB | 1 |
| Resistance | 5 – 1000 Ohm | 1 Ohm | ±5% |
| Network Specifications<br>Cabling Standards<br><br><br>Ethernet<br>Legacy Networks | <br>TIA/EIA-606-A and TIA/EIA-568-B Category 3 through 7<br>ISO/IEC 11801, EN 50173 and Australia/New Zealand Classes C, D, E and F<br>UTP, STP and SCTP cabling<br>IEEE 802.3 10BASE-T, 100BASE-TX, 1000BASE-T, 10GBASE-T<br>IEEE 802.5 Token Ring and IBM Type 1<br>TP PMD interfaces | | |
| Supported Tests | Attenuation (Insertion Loss)<br>Near End Crosstalk (NEXT) in pair-to-pair and/or PowerSum format<br>Equal Level Far End Crosstalk (ELFEXT)<br>Return Loss and Loop Resistance<br>Wiremap<br>Cable length, Total Propagation Delay and Delay Skew between pairs | | |

1 If not otherwise mentioned, specifications are according to TIA Level IV definition

# N2647MM Multimode (850 nm / 1300 nm) and N2647SM Single Mode (1310 nm / 1550 nm) Fiber SmartProbe

## General Specifications

- Size: 79.5 mm x 64 mm x 44 mm (3.1" x 2.5" x 1.7")
- Connectors: 2 x SC (Transmitter, Receiver)
- Operating Temperature: 0°C to +40°C
- Storage Temperature: –40°C to +55°C

| Specification | N2647MM Multimode SmartProbe | N2647SM Single Mode SmartProbe |
|---|---|---|
| Power Meter | | |
| Detector Type | InGaAs | InGaAs |
| Calibrated Wavelengths | 850 nm, 1300 nm | 1310 nm, 1550 nm |
| Measurement Accuracy | ±0.25 dB at –20 dBm[1] [2] | ±0.25 dB at –20 dBm [1] |
| Power Measurement Range | 0 to –42 dBm | 0 to –42 dBm |
| Transmitter | | |
| Source Type | LED | Fabry-Perot Laser |
| Center Wavelength | 850 nm, 1300 nm (nominal) | 1310 ± 30 nm, 1550 ± 30 nm, |
| Output Power | ≥ –20.5 dBm (into 50/125 µm fiber)<br>≥ –19 dBm (into 62.5/125 µm fiber) | –6 dBm (into 9/125 µm fiber) |
| Laser Stability | n/a | ±0.1 dB (1 hour, after 5 minutes warming up) |
| Fiber Network Specifications | | |
| Cabling Standards | TIA 568A, 568.3, ISO 11801 | TIA 568A, 568.3, ISO 11801 |
| Gigabit Ethernet | 1000BASE-SX, 1000BASE-LX | 1000BASE-LX |
| Legacy Networks | 100BASE-F,<br>10BASE-FL, 10BASE-FB, Token Ring | |
| ATM / SONET | ATM-155 (UNI 3.1), ATM-155 SWL,<br>ATM-622, ATM / SONET OC-3, -OC-12 | ATM-622, ATM / SONET OC-3, OC-12, OC-48 |
| FDDI / Fiber Channel | FDDI, Fiber Channel-133, -266, -531, -1062 | FDDI, Fiber Channel-133, -266, -531, -1062 |
| Propagation Delay | | |
| Accuracy (whichever is greater) | ±2% or ±3.6 ns | |
| Resolution | ±4.2 ns | |
| Measurement Range | 0 to 300 µs | |
| Fiber Length | | |
| Accuracy (whichever is greater) | ±2% or ±0.72 m | ±2% or ±0.72 m |
| Resolution | 0.83 m at refractive index 1.4785 | 0.83 m at refractive index 1.4785 |
| Distance Range | 0 to 8 km for 1.50 dB / km at 1300 nm [3] | 0 to 50 km for 1.50 dB / km at 1310 nm [4] |

1 At room temperature, 23°C ± 3K

2 With 50 / 125 µm fiber

3 Assumes double-ended configuration with 12 dB max. link loss. Divide by 2 for single-ended configurations.

4 Assumes double-ended configuration with 25 dB max. link loss. Divide by 2 for single-ended configurations.

## Laser Safety (N2674SM Fiber SmartProbe )

Fabry-Perot Class 1 Laser Product in accordance with IEC 60825.1 and FDA 21 CFR 1040.10

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